

LEE -- 10/733,276
Attorney Docket: 040008-0307078

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1.-10. (Canceled)

11. (Previously presented) The method of claim 13, wherein the second conductive line is formed of copper.

12. (Canceled)

13. (Currently amended) A method of manufacturing a semiconductor device, comprising:
forming a first insulating layer on a semiconductor substrate;
forming a first conductive line by depositing a conductive material on the first insulating layer and selectively patterning the conductive material;
forming a second insulating layer by depositing an insulating material on top of the substrate including on the first conductive line;
forming a via hole and a trench by selectively patterning the second insulating layer to expose a certain portion of the first conductive line;
removing a natural oxide layer, formed on the first conductive line through natural oxidation of the first conductive line, by heat treating in an H_2+CO gas atmosphere;
forming a metal barrier by depositing a metal layer on top of the substrate including in the via hole and on the trench;
forming a copper seed layer on top of the metal barrier;
removing a natural copper oxide layer, formed on the copper seed layer through natural oxidation of the copper seed layer, by heat treating in an $[[H_2]] H_2+CO$ gas atmosphere;
depositing a conductive material for forming a conductive line on top of the substrate including on the metal barrier and the copper seed layer to sufficiently fill the via hole and the trench;
forming a plug and a second conductive line by planarizing the conductive material on the second insulating layer in order to expose the second insulating layer; and

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removing a natural oxide layer, formed on the second conductive line through natural oxidation of the second conductive line, by heat treating in an H_2+CO gas atmosphere.

14. (Original) The method of claim 13, wherein the heat treatment is performed at room temperature to 200° C.